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TITLE:

Outcomes of 27-Gauge Microincision Vitrectomy Surgery for Posterior Segment Disease

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Dear Editor

We agree with Ali Khan et al that 27 gauge vitrectomy can be used successfully in a variety of surgical indications.¹ In the discussion they observe the apparent paradox that despite the reduced instrument size and consequent reduced aspiration flow, total surgical times were not prolonged. We have some additional data which would add to this discussion. We recorded total operative time as well as the time period when the cutter was activated removing vitreous ('cutting time') on a consecutive series of 25 gauge and 27 gauge vitrectomies carried out by one surgeon for macular hole and pucker from January to October 2015. There were 30 patients in each group with a similar spread of age and surgical indications including the presence and absence of vitreous separation at the time of surgery. Surgery was carried out using the Alcon Constellation 25 g+ and 27g+ systems. Combined phacovitrectomy was carried out in approximately half the cases. Linear aspiration of 0-500 and 0-650mmHg and cut rates of 5000 and 7500 were used for 25 g and 27 g respectively.

Overall the mean cutting and operative times were not significantly different at 348 seconds/28.4 minutes in the 27 gauge group and 323 seconds/ 27.9 minutes in the 25 gauge group ($p=0.23$ and 0.79 respectively). Phacovitrectomy surgery was approximately 8 minutes longer than vitrectomy alone (32.6 minutes versus 24.3 minutes, $p<0.001$) but cuttings time were equivalent (333 versus 339 seconds, $p=0.89$).

There are two important things to observe from this data. Firstly despite the reduced diameter of 27g this did not significantly prolong the vitreous removal times. As Ali Khan et al commented dual pneumatically operated vitrectomy probes can maintain flow rates with high cut rates by maintaining a predominantly open duty cycle. Furthermore higher cut rate results in apparent lower vitreous viscosity so that flow rate is maximised. (Abulon DJK, et al. IOVS 2012;53:ARVO E-Abstract 36915) Despite this experimental studies have shown a flow rate of approximately 1.15cc/minute with 25g and 0.5cc/min with 27g with the settings used (Abulon DJK, et al. IOVS 2012;53:ARVO E-Abstract 36915).² It is likely that altered surgical technique was responsible for maintained 'cutting' time. Vitreous removal only occurs when the cutter is within vitreous. 27g instruments have approximately half the rigidity of 25g. This reduced rigidity combined with reduced flow, acting to attract vitreous to the cutter, means it is necessary for the surgeon to pivot instruments around the sclerostomy more to keep instruments in contact with vitreous.³ This is clearly possible with 27 g as our figures show.

Secondly the percentage time of the surgery spent removing vitreous was approximately 20% in both 25g and 27g macular surgery. It can be seen therefore that reducing vitreous removal times by increasing flow rates would only have a relatively limited effect on total operative time. This is also a potentially detrimental aim as vitreous and retinal traction increases with flow rate, unless cut rate is also increased.

As vitrectomy gauge reduces there are several engineering and surgical challenges but prolonged surgery time does not necessarily occur with 27 gauge as compared to 25 gauge for macular surgery.

Yours faithfully

References

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